TECTONOPHYSICS—Volume 209—No. 1–4

IASPEI

SEISMOLOGY AND RELATED SCIENCES IN AFRICA

Selected papers from the IASPEI: Regional Seismological Assembly in Africa, held in Nairobi, Kenya, August 22–29, 1990; and co-sponsored by UNESCO and ICL

Edited by

C.J. EBINGER

Department of Earth Sciences, University of Leeds, Leeds LS2 9JT, UK

H.K. GUPTA

Ministry of Science and Technology, Department of Science and Technology, New Dehli 110016, India

and

I.O. NYAMBOK

Department of Geology, University of Nairobi, Nairobi, Kenya

CONTENTS

Preface ix
The international seismological observing period in Africa
E.R. Engdahl and E.A. Bergman (Denver, CO, USA) 1
Very-broad-band seismology in Northern Africa under the MEDNET project
D. Giardini, E. Boschi, S. Mazza, A. Morelli (Roma, Italy), D. Ben Sari, D. Najid (Rabat, Morocco), H. Benhallou, M. Bezzeghoud (Bouzareah, Algeria), H. Trabelsi, M. Hfaidh (Carthage, Tunisia), R.M. Kebeasy and E.M. Ibrahim (Helwan, Egypt) 17
Instrumentation and seismicity in Zambia (*Extended abstract*)
K.D. Lombe and M.S. Mubu (Lusaka, Zambia) 31
The South African National Digital Seismological System (SANDSS), a dial-up telephone-linked network
L.M. Fernandez, M.A. Otto and J. Steyn (Pretoria, South Africa) 35
Monitoring recent microseismic activity in Ghana (*Extended abstract*)
M.A. Akoto (Legon, Ghana) and S.A. Anum (Accra, Ghana) 43
The "Soufriere" system: PC-based instrumentation for acquiring and processing data from seismograph networks (*Extended abstract*)
D. Beckles (Oxon, UK), J.B. Shepherd (Lancaster, UK) and W.P. Aspinall (Sunbury-on-Thames, UK) 47

Recent seismicity of the East African rift system and its implications (*Extended abstract*)
F. Kebede (Addis Ababa, Ethiopia) and O. Kulhánek (Uppsala, Sweden) 51
Constraining the African pole of rotation
L.M. Asfaw (Addis Ababa, Ethiopia) 55
Seismotectonics in the Republic of Djibouti, linking the Afar Depression and the Gulf of Aden
J.-C. Lépine (Paris, France) and A. Hirn (Djibouti) 65
Regional geodynamic implications of the May–July 1990 earthquake sequence in southern Sudan
R. Gaulon, J. Chorowicz (Paris, France), G. Vidal (Lyon, France), B. Romanowicz and G. Roult (Paris, France) 87
Waveform modelling of the May 20, 1990 Sudan earthquake
D. Giardini and L. Beranzoli (Rome, Italy) 105
Mesozoic and early Tertiary rift tectonics in East Africa
W. Bosworth (Maadi, Egypt) 115
Lineament map of Kenya: correlations of lineaments to known geological data (*Extended abstract*)
S.J. Gaciri (Nairobi, Kenya) 139
Structure and stratigraphy of the Rukwa rift
E.A. Kilembe (Dar es Salaam, Tanzania) and B.R. Rosendahl (Miami, FL, USA) 143
The Malawi rift: geology, tectonics and seismicity (*Extended abstract*)
L.S. Chapola and C.E. Kaphwiyo (Zomba, Malawi) 159
The Malawi earthquake of March 10, 1989: a report of the macroseismic survey (*Extended abstract*)
H.K. Gupta (Dallas, TX, USA) 165
Rift system for Proterozoic schist belts in Nigeria (*Extended abstract*)
A.A. Elueze (Ibadan, Nigeria) 167
Seismotectonic study in northern Tunisia (*Extended abstract*)
M. Dlala (Tunis, Tunisia) 171
Seismotectonic study in Central and Southern Tunisia (*Extended abstract*)
L. Chihi (Tunis, Tunisia) 175
On the structure of the crust and upper mantle beneath the Afro–Arabian region from surface wave dispersion
O. Hadiouche (Karlsruhe, Germany) and W. Zürn (Wolfach, Germany) 179
A study of the Kenya Rift using delay-time tomography analysis and gravity modelling
U. Achauer (Karlsruhe, Germany) 197
Geophysical models of the Kenya Rift (*Extended abstract*)
M.A. Khan, P.K.H. Maguire (Leicester, UK) and C.J. Swain (Cambridge, UK) 209
Heterogeneity in the lower mantle beneath Africa, as revealed from S and ScS phases
S. Tanaka and H. Hamaguchi (Sendai, Japan) 213
Seismicity of central Madagascar and the imaging of the Moho depth (*Extended abstract*)
J.P. Fourno and J. Roussel (Marseille, France) 223
Crustal thinning during rifting: a possible signature in radiogenic heat production
V. Čermák (Prague, Czechoslovakia) and L. Bodri (Budapest, Hungary) 227
Process of the 1977 Nyiragongo eruption inferred from the analysis of long-period earthquakes and volcanic tremors
H. Hamaguchi, T. Nishimura (Sendai, Japan) and N. Zana (Bukavu, Zaire) 241
Main geophyscial features related to the Virgunga zone, Western rift, and their volcanological implications (*Extended abstract*)
N. Zana (Bukavu, Zaïre), K. Tanaka (Hirosaki, Japan and A.M. Kasahara (Hokkaido, Japan) 255
Recent seismicity of the Virunga volcanic zone, Western rift, Zaire (*Extended abstract*)
M. Wafula, N. Zana, T. Mavonga and A.M. Sassa (Bukavu, Zaire) 259
Main pattern of waveforms observed in the Virunga volcanic zone, Western rift valley of Africa N. Lukaya, M. Ciraba, T. Mavonga and M. Wafula (Bukavu, Zaire) 261
Recent horizontal crustal movements in and around volcano Nyamuragira, Zaire
M. Kasahara (Sapporo, Japan), H. Hamaguchi (Sendai, Japan), K. Tanaka (Hirosaki, Japan), N. Zana and M. Kabwik (Bukavu, Zaire) 267
Major element chemistry of recent eruptive products from Nyamuragira volcano, Africa (1976–1989) (*Extended abstract*)
S. Hayashi (Arita, Japan), M. Kasahara (Sapporo, Japan), K. Tanaka (Hirosaki, Japan), H. Hamaguchi (Sendai, Japan) and N. Zana (Bukavu, Zaire) 273
Rift-related volcanic hazards in Tanzania and their mitigation (*Extended abstract*)
A.L. Tesha (Dodoma, Tanzania), C.J. Ebinger (Leeds, UK) and C. Nyamweru (Nairobi, Kenya) 277
Cenozoic volcanism in Western Senegal and its relationship to the opening of the Central Atlantic Ocean
P.G. Lo, A. Dia (Dakar, Sénégal) and A.B. Kampunzu (Lubumbashi, Zaire) 281
Reappraisal of major African earthquakes, south of 20°N, 1900–1930 (*Extended abstract*)
N.N. Ambraseys (London, UK) and R.D. Adams (Newbury Reading, UK) 293
A model of apparent resistivity changes in earthquake preparational areas (*Extended abstract*)
K. Meyer (Uppsala, Sweden) and L.M. Asfaw (Addis Ababa, Ethiopia) 297

Seismic risk at a site in the East African rift system
L.M. Asfaw (Addis Ababa, Ethiopia) 301
Seismic hazard in East Africa: an example of the application of incomplete and uncertain data (*Extended abstract*)
P. Mäntyniemi (Helsinki, Finland) and A. Kijko (Warsaw, Poland) 311
Seismicity of Tanzania: distribution in time, space, magnitude, and strain release
M.D. Iranga (Dar es Salaam, Tanzania) 313
Estimation of earthquake risk in Zaire (*Extended abstract*)
N. Zana, K. Kavotha and M. Wafula (Bukavu, Zaire) 321
A review of seismic monitoring and earthquake prediction in China
J. Xiu (China) 325
Advances in reservoir-induced seismicity research in China
P. Hu and Y. Hu (Beijing, China) 331